RUC change package - 2008
Update – 31 October 2007

Getbufr (RUC prepBUFR-to-ASCII interface program, runs before RUC analysis)

- Add mesonet provider information for each mesonet report to output ASCII files for mesonet data (*.mso).
- Give priority to mesonet report that matches analysis valid time rather than use oldest report out of high-frequency mesonet data.
- Read in TAMDAR data including TAMDAR aircraft moisture information

RUC_rad-prep

- New program for reading in 3-d radar tiles to interpolate horizontally to RUC grid points, retaining radar AGL vertical levels at this point.
- Should run at 5-10 min after hour. GSD version run on single processor, taking 10 min.
- Additional script to run at separate time from /p40/naos-ruc/13km/scripts/run.13.nssl_refl

Hybfront – RUC analysis

- Use of mesonet data
    - Use of mesonet winds for obs from approved station list (about 4400 out of 12000 total stations).
        - Mesonet station wind uselist based on reports with wind speed bias less than 1.0 m/s respective to RUC 1-h forecasts over a 10-day period.
    - Individual otypes (variable for “observation type”) for each mesonet provider, replacing previous single otype for all mesonet data.
    - Revised mesonet provider list
- Use of raobs
    - Distinction between non-GPS and GPS rawinsondes for obs error and for O-B (obs-background difference) stats for monitoring
- Radar reflectivity assimilation
    - Assimilation of 3d radar reflectivity – pre-processing of radar temperature tendency, moistening (increasing water vapor mixing ratio) where Z > 5 dbZ
    - Produces new tten_radar.out output file to be read in by hybcst where diabatic DFI with radar-based latent heat specification is applied.
- Add CAP profiler data into RUC with new QC (O-B threshold) limits designed specifically for these observations.
- Larger size of output NNT_dat files.

Hybcst_pr – RUC model preprocessor

- No changes

hybcst – RUC model

- Revised snow model (soilsnow.F)
  - improved treatment for nighttime treatment over fresh snow – revision to snow density
- Revised Grell-Devenyi convective scheme
  - cap strength changed to decrease areal coverage for light convective precip – 2-line change
  - non-local specification of subsidence warming rather than at local grid point.
- RRTM longwave radiation instead of Dudhia LW (lwrad.F)
  - Improved nighttime temperatures, less nighttime 2m warm bias in warm-season, less excessive 2m cold bias over snow
- Specification of observed latent heating from 3-d radar data (tten_radar.dat) in forward diabatic step of DFI.
- Relaxed coordinate adjustment. Instead of moving coordinate fully to target coordinate (defined by sigma or reference theta level), now move only 10% of the full regridding within each time step. This produces quieter RUC model forecasts and also improves precipitation forecasts.
- Remove print statements in DFI, saves ~1 min in run time.
- Add output of 15-min precip fields to NNT_dat fields (for hourly output for use of 15-min convective precip for reflectivity fields).

Hybpost

- add max reflectivity (max, 1km, 4km) to output
  - based on combined resolved and sub-grid-scale components
    - resolved - calrefl.f – using appropriate NCAR-Thompson scheme Z-q relationships for rain, snow, graupel
    - sub-grid-scale - uses 15-min convective precipitation field for convective component
  - added to ruc_presm 2-d fields
  - follows NAM reflectivity output fields

- Added run-total accumulated precip and snow, also following similar fields in NAM output.

- Modify ceiling calculation to avoid excessive LIFR (ceiling < 500 ft) conditions from vertical interpolation of cloud water/ice for ceiling calculation. Instead, for 6 levels closest to surface only, set ceiling as first level above surface at which cloud water exceeds cloud threshold value.

- Added 2-d variable (RH-PW) for columnwise relative humidity with respect to precipitable water for a saturated column (e.g., PW / PW-sat). This field shows excellent continuity for a PW-derivative in flow across variable terrain elevation.

- Update RTMA downscaling for RUC output to range of acceptable lapse rates to allow sharper inversions in fine-scale valleys when radiative cooling is likely dominant, allowing cold air pooling.

Fslparms (/nwprod/fix at NCEP) files

- **Grib.table**
  - Add new variables for reflectivity variables (max, 1km, 4km) and for total accumulated precip (non-convective, convective).
- Rawinsonde-GPS.dat (new)
- Mesonet station wind use table (new)